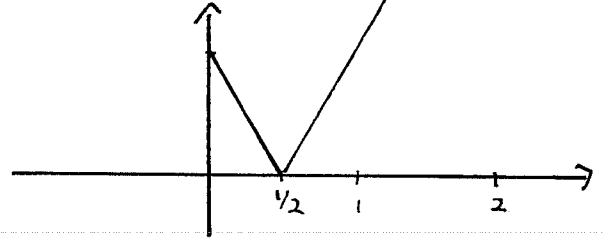


## Quiz 4

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. (5 marks) §5.3 #28 Evaluate the integral.

$$\begin{aligned} & \int_0^2 (|2x-1|) dx \\ &= \int_0^{1/2} |2x-1| dx + \int_{1/2}^2 |2x-1| dx \\ &= - \int_0^{1/2} 2x-1 dx + \int_{1/2}^2 2x-1 dx \\ &= - \left[ x^2 - x \right]_0^{1/2} + \left[ x^2 - x \right]_{1/2}^2 \\ &= - \left[ \left(\frac{1}{2}\right)^2 - \frac{1}{2} \right] + \left[ \left[ 2^2 - 2 \right] - \left[ \left(\frac{1}{2}\right)^2 - \left(\frac{1}{2}\right) \right] \right] \\ &= \frac{1}{4} + 2 + \frac{1}{4} = \frac{5}{2} \end{aligned}$$



Question 2. §5.4 #20

- (2 marks) Find the average value of  $f$  on the given interval.
- (2 marks) Find  $c$  such that  $f_{ave} = f(c)$ .
- (1 mark) Sketch the graph of  $f$  and a rectangle whose area is the same as the area under the graph of  $f$ .

$$f(x) = (x-3)^2, [2, 5]$$

$$\begin{aligned} f_{ave} &= \frac{1}{b-a} \int_a^b f(x) dx \\ &= \frac{1}{5-2} \int_2^5 (x-3)^2 dx \\ &= \frac{1}{3} \int_2^5 x^2 - 6x + 9 dx \\ &= \frac{1}{3} \left[ \frac{x^3}{3} - 3x^2 + 9x \right]_2^5 \\ &= \frac{1}{3} \left[ \left[ \frac{5^3}{3} - 3 \cdot 5^2 + 9(5) \right] - \left[ \frac{2^3}{3} - 3 \cdot 2^2 + 9(2) \right] \right] \\ &= \frac{1}{3} \left[ \frac{125}{3} - 75 + 45 - \frac{8}{3} + 12 - 18 \right] \\ &= \frac{1}{3} \left[ \frac{117}{3} - 36 \right] = \frac{1}{3} \left[ \frac{117 - 108}{3} \right] = 1 \end{aligned}$$

$$\begin{aligned} \text{b) } 1 &= f(c) \\ 1 &= (c-3)^2 \\ \pm 1 &= c-3 && \text{so } c = 2 \text{ and } 4 \\ 3 \pm 1 &= c \end{aligned}$$

